YOUR NATIONAL WEATHER SERVICE SPOKANE QUARTERLY REPORT

VOL XIV, ISSUE 4
DECEMBER 2010

The Weather Watcher

of the Inland Northwest

www.weather.gov/Spokane

Ice Jams and Flooding Threats

Ice jams can occur across the Inland Northwest each year. According to the Ice Jam Database, eastern Washington has reported about 20 events, especially on the Little Spokane, Palouse and Methow rivers. The Idaho panhandle has reported nearly 40 ice jam events, especially on the St. Joe, St. Maries, Kootenai, and Coeur d'Alene rivers. Montana has the highest number of reported ice jams in the lower 48 states with over 1400 reports of ice jams. About a third of the U.S. ice jam events occur during the middle of winter in January and February, while most of the events occur during the spring melting period.

Ice jam breakup on Poorman's Creek February 2009.

The annual ice freeze-up and breakup commonly occurs without major flooding on regional rivers. Unfortunately some communities can face serious ice jam threats and flooding. The most devastating winter floods have been associated with a combination of heavy rainfall and rapid snow melt followed by ice jams.

Heavy snowfall and frigid temperatures, followed by a sudden warm spell can increase the risk of flooding from snow melt and ice jams. During thaws, runoff from snow melt increases the flow of water in rivers. This increased flow raises the water level, which pushes up on ice sheets covering the top of the river. If the ice sheets break apart, they move downstream in a surge of large ice chunks. Where the flow is restricted, like river bends or around bridges, the ice can pile up and an ice jam will form. The jam may then build-up great enough to dam the river and cause flooding. The National Weather Service will issue Flash Flooding Watches and Warnings for severe ice jam flooding events. ☼ *Robin Fox*

Early Season Heavy Snow in the East Slopes

The second weekend in December delivered the first major snowstorm of the season for the east slopes of the Cascades. This massive storm tapped into moisture pouring northeast from Hawaii. The result was an atmosphere with nearly two and half times the normal amount of moisture. This phenomenon occurs just about every winter and is commonly referred to as a Pineapple Connection. While this atmospheric setup often results in temperatures surging above freezing with heavy rain across the Inland Northwest, it was a little different in the lee of the Cascades. The key difference was the sub-freezing air which was too stubborn to leave, otherwise known as "cold-air damming. " Near the east slopes of the northern Washington Cascades, cold-air damming often occurs when the low level winds blow out of the east, piling up the cold air east of the crest. Meanwhile the deep moisture surge associated with southwest winds above crest level resulted in heavy precipitation, leading to snow from the Wenatchee area and Waterville Plateau north to the Methow Valley. Snow began to fall on the morning of December 11th and didn't end until early on December 12th. Snowfall totals were very impressive with several records broken for the for the date, including Holden Village, Mazama, and Winthrop. At the Entiat Fish Hatchery, 13" of snow fell which was the second most snow ever recorded on any calendar date. See some of the snow reports on the back page. ☼ *Jon Fox*

INSIDE THIS ISSUE:

Editor's Notes

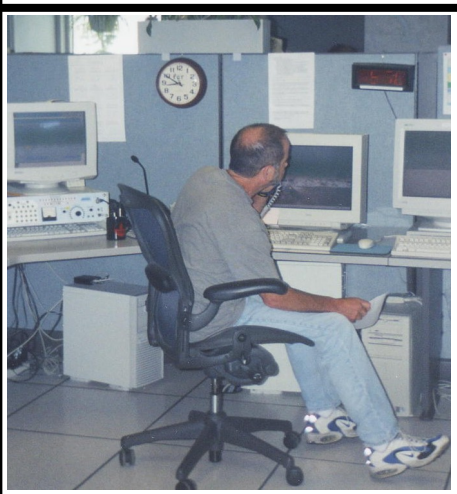
The long range forecast keeps cool and wet winter weather across the Inland Northwest through February—thanks to a strong La Nina event. Studies have shown that we can expect higher than normal season snowfall. Normal snowfall for Spokane is near 42". But this is not to say that we won't have mild days too. A strong La Nina doesn't mean severe weather all winter long.

We are always looking for new ideas and stories for our publication. If you have any ideas or pictures you would like to share, please contact Robin at (509) 244-0110 or send an email note to nws.spokane@noaa.gov.

This newsletter and past issues are available online on the NWS Spokane web page. If you would like a paper copy, please contact us and we will be happy to put you on the mailing list.

The main purpose of this publication is to keep our readers informed about NWS services and programs, and recognize those who help us with our mission, including weather spotters, observers, media, emergency managers, and government agencies.

All articles are written by the NWS staff. A big thanks to Ron Miller, Stan Savoy and Jon Fox for their help.



Stan hard at work monitoring the weather.

Farewell to Stan Savoy

After almost 40 years of government service, Stan Savoy will begin his retirement from the National Weather Service Spokane on January 1, 2011. As a native of Salem, OR, Stan began his career in the Air Force in 1971 and spent time in Okinawa, Japan. After the Air Force, he started in the National Weather Service taking observations in Spokane in 1975. Stan transferred to Winnemucca, Nevada for a year an a half before returning to Spokane. He has been part of the Spokane staff ever since. Stan has seen many changes in the National Weather Service with the modernization of the forecast office, the arrival of the weather radar, and changes with the observation program. Stan has been active in the upper air and the cooperative observation program. Although he will miss his regular trips to the coop stations, he looks forward to sleeping normal hours and eventually spending his time in the Caribbean. Good luck to Stan and future plans. ☼ *Robin Fox*

Autumn Weather Statistics

Wenatchee Water Plant	Sep	Oct	Nov	Total
Avg High Temp	74.4	64.9	43.9	61.1
Departure from Norm	-3.3	+1.2	-2.0	-1.4
Avg Low Temp	52.4	42.7	29.9	41.7
Departure from Norm	+1.2	+1.9	-2.3	+0.3
Total Precip	0.94	0.29	1.02	2.25
Departure from Norm	+0.54	-0.20	-0.34	0.00
Total Snowfall	0.0	0.0	5.2	5.2
Departure from Norm	0.0	0.0	+2.8	+2.8
Lewiston Airport	**Sep**	**Oct**	**Nov**	**Total**
Avg High Temp	77.5	63.2	45.5	62.1
Departure from Norm	+0.8	+1.3	-1.3	+0.3
Avg Low Temp	52.8	44.2	31.5	42.8
Departure from Norm	+1.9	+3.0	-2.6	+0.8
Total Precip	0.7	1.20	1.03	2.93
Departure from Norm	-0.11	+0.24	-0.18	-0.05
Total Snowfall	0.0	0.0	6.7	6.7
Departure from Norm	0.0	-0.1	+4.7	+4.6
Spokane Airport	**Sep**	**Oct**	**Nov**	**Total**
Avg High Temp	70.9	58.5	39.2	56.2
Departure from Norm	-1.6	0.0	-1.9	-1.2
Avg Low Temp	48.7	40.9	27.0	38.9
Departure from Norm	+2.8	+5.1	-1.7	+2.1
Total Precip	0.69	1.54	3.10	5.33
Departure from Norm	-0.07	+0.48	+0.86	+1.27
Total snowfall	0.0	T	25.9	25.9
Departure from Norm	0.0	-0.3	+19.5	+19.2

Spotter Corner

Spotter training has picked up this fall—in order to get folks ready for the winter weather. Remember if you need a refresher and want to review the spotter checklist, it's on our web page at http://www.weather.gov/spokane/spotter.php. Currently we have well over 900 weather spotters across eastern Washington and north Idaho. We appreciate all your reports and love your weather pictures. Keep them coming in!

On Dec 3-4th, the 12th annual Skywarn Appreciation Day was celebrated at the Spokane NWS. This is when the Spokane ARES/RACES amateur radio group sets up their stations at the weather office and gathers weather data from the region. Most of the contacts were from the Inland Northwest. But during the night, they were able to contact other amateur radio "spotters" across the country and exchange weather data. This included Palm Springs at 67º and Lake Charles, LA at 71º, compared to Spokane at 17º. The Spokane ARES/RACES group made over 200 contacts. Great Job! ☼ *Robin Fox*

SPOTTER REPORTS:
244-0435 or *espotter.weather.gov*

The rare tornado from the Camas Prairie on October 7.

Want to report precipitation? Check out CoCoRaHS at *http://www.cocorahs.org*

Autumn 2010 in Review

Our typically beautiful Fall weather did not disappoint this year. Winter did come a little earlier than normal, with quite a vengeance.

September started on a warm note, with temperatures reaching the mid 80s to lower 90s on the 3rd. This came to a quick end with a strong dry cold front. Blowing dust in the Columbia Basin on the 4th closed some roads for awhile due to poor visibilities. Behind the front temperatures were below normal for about a week. A very wet weather system moved through the area on the 19th, bringing moderate to heavy rain to just about everyone. Daily rainfall records were set from Wenatchee and Omak across to Pullman. Ephrata picked up 0.51" of rain while La Crosse received 0.57". Heavy rain washed out a road near Tonasket. September had one more taste of summer-like weather at the end of the month, with temperatures once again warming into the 80s on the 28th.

This warmth continued into early **October**, with temperatures running 15º above normal on the first 2 days of the month. Five days later, high temperatures were 25º cooler, but the air was rather moist so the nighttime lows stayed rather mild. The 7th saw a rare occurrence of a tornado on the Camas Prairie southeast of Lewiston. While it did no damage, it was very unusual for October. This was actually spawned by the same storm system that produced several tornadoes in the Flagstaff, AZ area the day before. Quiet weather set in for the middle part of the month, before another wet storm system passed through on the 24th. Ephrata and Moses Lake both set daily rainfall records with 0.26" and 0.23" respectively. Meanwhile, with snow levels down to around 5000 feet, the mountains picked up their first heavy accumulation of snow, with some reports of up to 20". Overall, October was a rather mild and wet month. The mercury dropped below freezing only twice at the Spokane Airport, compared to an average of 7 times.

The mild weather of October gave way to a much harsher **November**. Colder air lowered snow levels to bring the first low elevation snow to the valleys of the eastern Cascades. The last gasp of mild fall weather came in the middle of November, as Wenatchee set a record high temperature on the 14th of 61º. A very impressive cold front moved into the Inland Northwest

Strong winds on November 16 near Lewiston.

bringing with it strong winds and nocturnal thunderstorms. Lewiston Airport gusted to 63 mph, a record for the month of November. Pullman-Moscow Airport recorded a gust to 85 mph. Wind gusts in excess of 60 mph were common throughout the area. Meanwhile heavy rain in northeast Washington brought nearly an inch of rain to many locations, with 1.18" observed at Chattaroy. Mountain ski resorts received considerable snowfall.

An equally impressive storm approached the area from the northwest on the 22nd, and prompted the issuance of blizzard warnings for many locations. The combination of heavy snow and strong winds caused many Columbia Basin roads to drift shut. Some snowfall reports included 9.7" at Newport, 11" at Anatone, 9" at Colfax, and 12" at Moscow. In its wake, cold air dropped the temperatures below zero at many locations. Record low temperatures on the 24th were set at Lewiston (-1), Omak (-6), Ephrata (-14) and Pullman (-10). More snow was on the way for the Thanksgiving holiday weekend through the end of the month. The storm on the 30th brought 10" to Sandpoint, 7.6" to Palouse, and 6.6" to North Spokane. Spokane set a snowfall record for the month of November with 25.9". ☼ *Ron Miller*

Wintry Thanksgiving weekend in Odessa.

Answer: at least 4 inches of new ice.

Remember your Winter Spotter Checklist

Snow:
2"+ valleys & 4"+ mountains

Strong Winds:
30 mph+ or damage

Reduced Visibility:
under a mile due to snow, fog.

Heavy Rain:
Showery: 1/2" + in 1 hr
Steady Rain: 1"+ in 12 hrs
or 1.5"+ in 24 hrs

Any flooding!

Hail: pea size or larger

Any mixed precipitation!

Travel Problems or
Any Damage: due to severe or hazardous weather.

Ice Safety

New ice is usually stronger than old ice. Four inches of new ice may support one person on foot, while a foot or more of old, partially thawed ice may not. As much as nine inches of new ice may be needed to support a snowmobile.

Ice seldom freezes uniformly. It may be a foot thick in one location and only an inch or two just a few feet away.

Ice formed over flowing water and currents is often dangerous. This is especially true near streams, bridges and culverts. Also, the ice on outside river bends is usually weaker due to the undermining effects of the faster current.

If You Fall Through the Ice

First Rule: Don't panic!

Second Rule: If you have a companion, have him lie down on the ice to distribute his weight. Then pass the end of a branch or rope to you to help pull you out and onto the ice. Then roll or wiggle to safety.

If you're alone, get your arms onto the ice and kick hard with your feet to help lift onto the ice, then roll to safety.

☼ *WA State & MN DNR*

Heavy snow in Waterville on December 12.

Heavy Snow Reports from December 11-12, 2010

Observers	Snowfall Totals
Mazama	21.0"
3W Chelan*	20.5"
Plain	18.0"
Holden Village	17.5"
Winthrop	17.0"
2ENE Leavenworth*	14.3"
Entiat Fish Hatchery	13.0 "
4S Wenatchee^	13.0"
^CoCoRahs report	**Trained Spotter report*

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Trivia: How thick does new ice have to be to support one person?